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## Note

# Biology of the black clam, *Villorita cyprinoides* (Gray) in the backwaters of Vembanad Lake

P. LAXMILATHA, T. S. VELAYUDHAN, V. KRIPA, JENNY SHARMA AND P. S. ALLOYCIOUS

*Central Marine Fisheries Research Institute, P.O. Box 1603, Cochin 682 014*

## ABSTRACT

Biology of the black clam from two fishing sites of the Vembanad Lake was studied. The environmental conditions of the two sites were also monitored. The observed differences in the growth pattern and breeding biology of the black clam from Nettoor and Muhamma are correlated to the hydrological parameters. These characteristics are discussed.

The black clam *Villorita cyprinoides* fishery of the Vembanad Lake is well organized through seven black clam cooperative societies. The clam is exploited primarily for the shell, while the meat is sold locally. The black clamshell is a valuable raw material required by various industries viz; lime kilns, cement, carbide, medicines, pharmaceutical, fertilizers, pesticides etc. The cooperative societies collect the shell and in turn sell them to the agents of the different industries. The biology and fishery of *Villorita cyprinoides* has been studied by Rasalam and Sebastian (1976), Sivankutty Nair (1975) Achary (1988), Kripa and Mathew (1993) and Laxmilatha and Appukuttan (2002).

Monthly samples were collected from two fishing areas in the Vembanad Lake - Muhamma and Nettoor during April 2000 to March 2001 and their length frequency, sex, maturity stages and meat percentage were recorded. The environmental parameters such as salinity, productivity, dissolved oxygen

and nutrient levels in the water collected from the two sampling sites were also analyzed.

## Biology

**Nettoor:** The dominant size groups of clam in the fishery were 10-12mm (30%) and 20-24mm (20%) followed by 18-20 mm (16.6%). The clams less than 14mm occurred during October and January and larger than 38 mm size occurred during April and June and March (Fig.1). The average meat content was 10.93% with low meat content in March (8.86 %) and highest in April (14.07%).

Males outnumbered females throughout the year (80:20). Immature males were found during June and October. The males in developing/ maturing stages were observed during May, August, November- December and January. Ripe males were dominant during April while spent males occurred during September and March.

Immature females occurred during October and January-February.

Developing/ maturing females occurred during September- November. A high proportion of ripe females were found during April and November. Females in spent condition occurred during July-September.

The length frequency data for the period April 2000 to March 2001 show several dominant modes at 22, 24 mm and 26 mm. In April, the mode at 22 shifted to 24 and 26 mm indicating growth of 2-4 mm in one month. This mode appears in subsequent months also indicating that the growth is not uniform. In July the mode was recorded at 30 mm, showing an increase of 6 mm in four months. Also, the presence of mode at 12 mm during October indicates a spawning during post monsoon months and the samples in the subsequent period probably represent the population from new brood spawned during the year. Thus, successive modes at 20, 22, 24 and 26 mm express growth increments of 2-4 mm representing probably two broods, the earlier as well as current broods. Mode above 30 mm was not recorded during the sampling period which could be due to continuous exploitation of the modal class 22 mm leading to absence of larger clams in the population.

**Muhamma:** The dominant size groups were 22-20 mm and 16-18 mm (15%) followed by 30-32 mm (14 %) and 24-28 (13%). The clams less than 14mm occurred in small numbers during October-November and larger than 38 mm size occurred during January (Fig. 2). The average meat content was 11.95% with low meat content in January (6.23%) and highest in September (18.76%). Males outnumbered the females throughout the year (75:25). Immature males were found during June and January. The males in developing/maturing stages

were observed during May, September, November- December and February-March. Ripe males were dominant during August -September while spent males occurred during May- July and August. The gonadal phases of the females were similar to that of the males. Immature females occurred during June and January. Developing/ maturing females occurred during September, November-December. A high proportion of ripe females were found during July-August. Females in spent condition occurred during October.

In Muhamma, several dominant modes occur at 18, 22, 32, 26 and 28 mm. In April, the modes occur at 16-18 mm and shift to 24, 26, 28 mm in May and to 30, 32, 34 mm in June. This clearly indicates that there are three size groups in the population and there is an increment of 4 mm in one month and 6-8 mm in two months. During July-September, the modes remain at 22-28 mm and during October-December, the modes occur at 18, 20, 22 mm respectively. This indicates that there is fresh recruitment into the fishery after the post monsoon spawning and growth is probably affected due to drop in salinity during the monsoon months. In January-February, the mode occurs at 30, 32 and 34 mm, indicating rapid growth in the two stocks existing in the population.

### **Hydrology**

**Nettoor:** During the sampling period April 2000 to March 2001, the salinity at Nettoor ranged from 3 ppt in August to 16 ppt in May. The dissolved oxygen content ranged from a high of 6.5 ml/L during August-November to a low of 2.83 ml/L in February.

The gross productivity recorded a high of 8.24 mg C/m<sup>3</sup>/day in July to 0.97

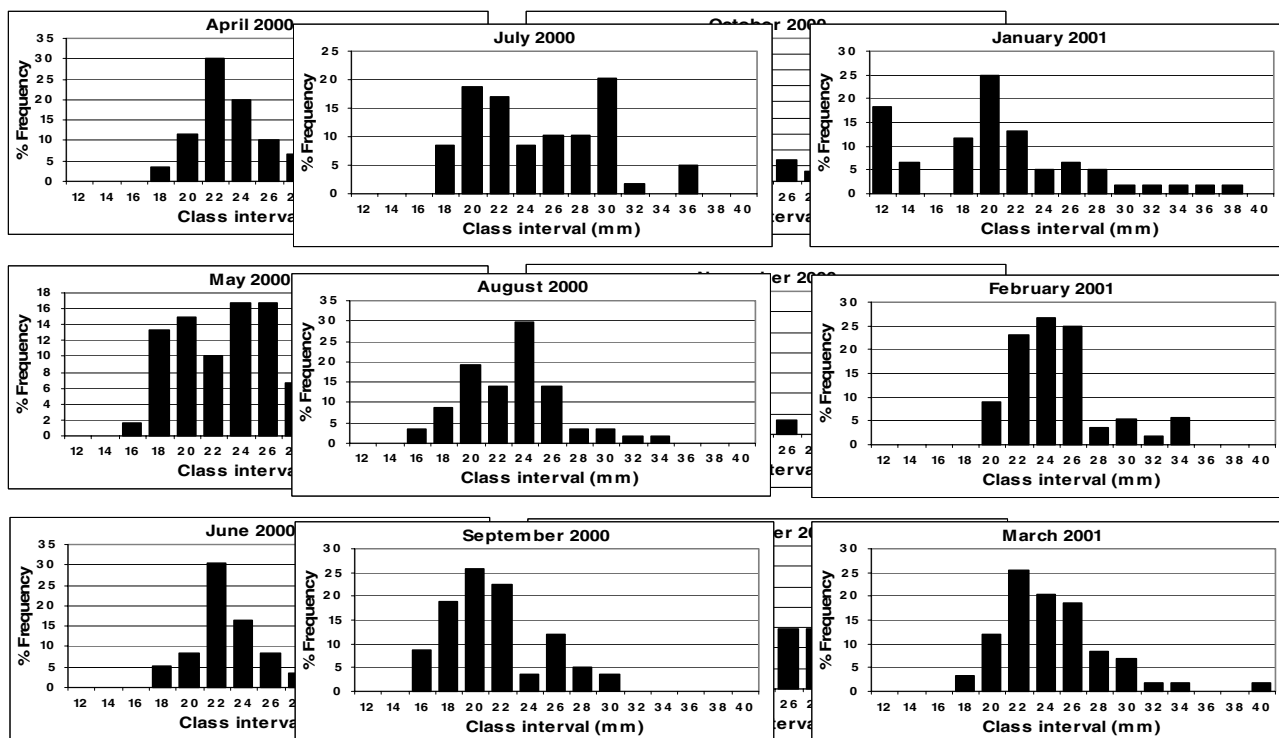
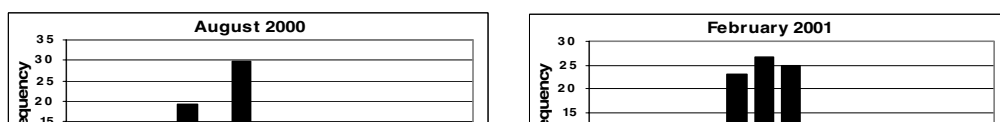


Fig.1. Length frequency % in *Villorita cyprinoides* from Nettoor during 2000-2001



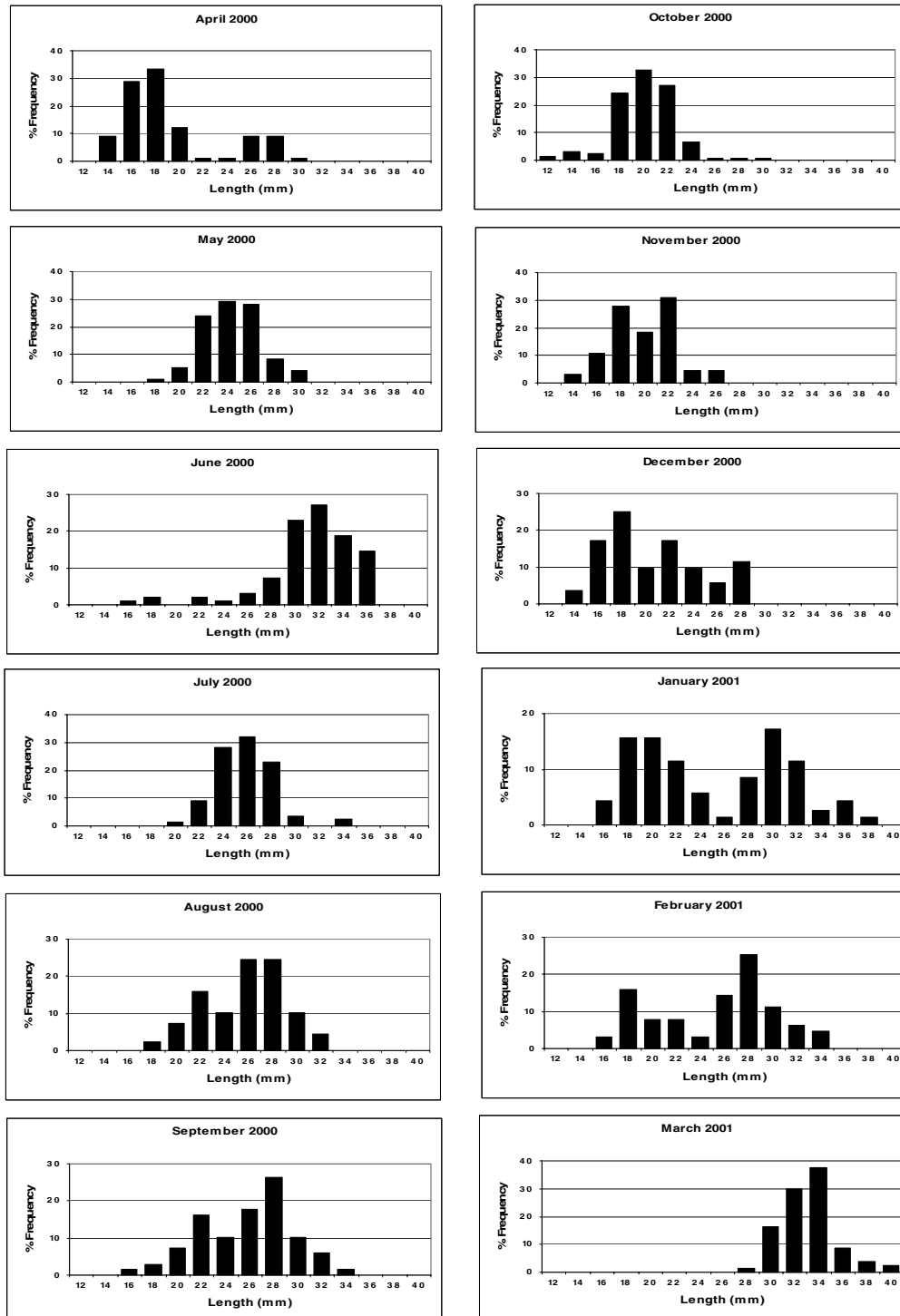


Fig.2. Length frequency % in *Villorita cyprinoides* from Muhamma during 2000-2001

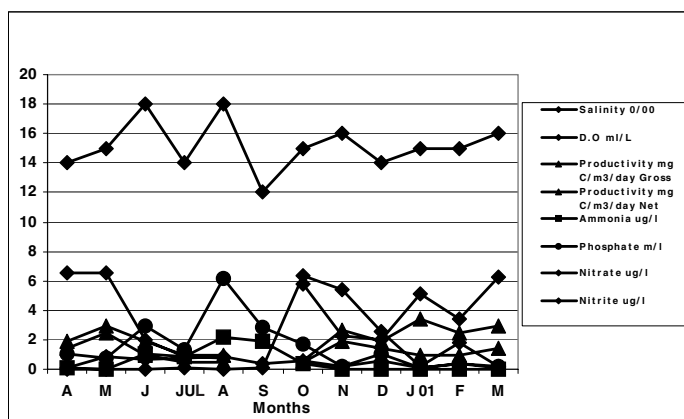


Fig. 3. Hydrological details: Nettoor 2000-2001

mg C/m<sup>3</sup>/day in December while the net productivity was 5.82 mg C/m<sup>3</sup>/day in July 0.97 mg C/m<sup>3</sup>/day in April, June and February (Fig. 3). The nutrient levels in the Nettoor site also showed variations. Ammonia recorded zero in May and as high as 31.16 µg/l in November; phosphate a low of 0.39 µg/l in December to a high of 12.11 µg/l in June; nitrate a low of 0.02 µg/l in September to 4.33 µg/l in February and nitrite a low of 0.87 µg/l in September and a high of 13.64 µg/l in November.

#### Muhamma

During the sampling period April 2000 to March 2001, the salinity at Muhamma ranged from 12 ppt in September to 18 ppt in August. The dissolved oxygen content ranged from a high of 6.5 ml/L during April-May to a low of 0.73 ml/L in August.

The gross productivity recorded a high of 3.39 mg C/m<sup>3</sup>/day in

January to 0.97 mg C/m<sup>3</sup>/day in October while the net productivity was 2.42 mg C/m<sup>3</sup>/day in May to 0.49 mg C/m<sup>3</sup>/day in August-October (Fig. 4). The nutrient levels in the Muhamma site also showed interesting variations. Ammonia recorded zero in May, November and January to a high of 2.22 µg/l in August; phosphate recorded a low of 0.11 µg/l in January to a high of 6.14 µg/l in August; nitrate a high of 0.86 µg/l in May to 0.06 µg/l in January and nitrite recorded zero in April-May and a high of 6.38 µg/l in October.

The two clam fishing sites, located in distinct niches of the Vembanad Lake, show interesting and dynamic fishery as well as hydrobiological characteristics. The obvious difference in the growth pattern and breeding biology in Nettoor and Muhamma is correlated to the fluctuations observed in the hydrological parameters viz., salinity, dissolved

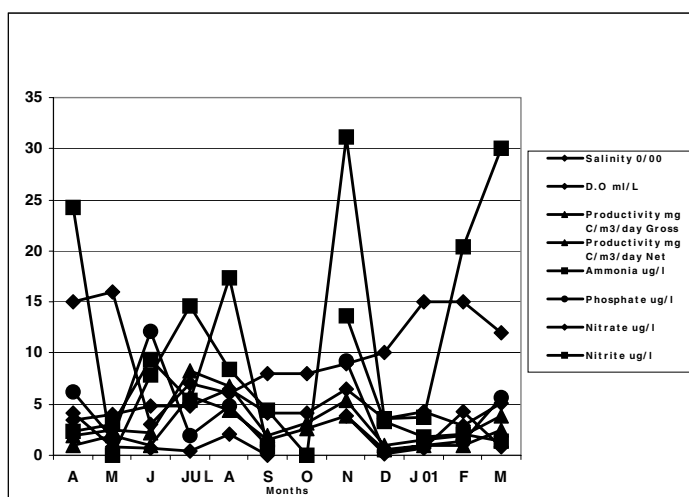


Fig. 4. Hydrological details: Muhamma 2000-2001

oxygen, productivity, and nutrients. While drastic variations occurred at Nettoor during the sampling period, a steady pattern was recorded at Muhamma. The Nettoor site experiences greater degree of hydrological variations due to influx of freshwater while Muhamma has more seawater influx. Sivankutty Nair (1975) has recorded 4-5 mm growth per month in *Villorita cyprinoides* var *cochinensis* also attributed retarded growth to low salinity. Growth is faster during early periods as has been observed by Salih (1973). Peaks of breeding activity were recorded twice a year from May to August-September and other from January to March. (Sivankutty Nair, 1975). Growth is either retarded or arrested during monsoon period (Sivankutty Nair, 1975).

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